

REMARKS

The presently claimed aqueous dispersion and water-based ink comprise a water-insoluble vinyl polymer that is prepared by polymerizing a certain monomer units. The monomers present in the polymerized monomer composition include compounds which have a single ethylenically unsaturated group. Applicants submit that the polymerization of a monomer mixture that contains only monomer units having a single ethylenically unsaturated group, under conventional polymerization conditions, provides a polymer having an linear main chain.

Applicants submit concurrently herewith a certified English translation of JP 2002-229952 (filed on August 7, 2002) which is the foreign application to which the present U.S. application claims benefit of filing date. Applicants submit that the certified English translation of the priority document in this case proves an earlier date of an invention and thus antedates the Mizushima published application cited against the present claims.

Applicants respectfully request withdrawal of the rejection in view of Mizushima.

Independent Claim 1 is amended herein to include the limitations of dependent Claims 2.

The Office rejected Claims 1 and 6-10 under obviousness-type double patenting and/or obviousness under the meaning 35 U.S.C. § 103(a) in view of pending U.S. Application No. 10/329,349. Present independent Claim 1 includes the limitations of previous dependent Claim 2. Claim 2 was not rejected under obviousness-type double patenting or obviousness in view of copending 10/329,349. Applicants submit that present independent Claim 1 is patentable over the cited co-pending application and respectfully request withdrawal of the rejection.

The Office rejected Claims 1-10 as anticipated by EP 1113051 (corresponding to US 2001/0023265 ("Hidaka")).

The Office admits that the polymer of Hidaka is a graft copolymer (see paragraph 7, third line on page 7 of the Office Action of July 29, 2005). In fact, the Office characterizes the prior art aqueous dispersion and water-based ink as follows:

“EP 1113051 discloses water-based ink comprising aqueous dispersion of water-insoluble vinyl polymer particles containing pigment including pigment Blue 15:4 wherein the polymer is **a graft copolymer** having acrylic side chain, salt-forming group, ...”

The graft copolymer of Hidaka is one that is “obtained by copolymerizing a (meth)acrylic macromer having a polymerizable functional group at one end with a monomer having a salt-forming group and a monomer copolymerizable” therewith (underline added; see paragraph [0038] of Hidaka).

In contrast to the polymer of Hidaka, the presently claimed invention recites a water-insoluble polymer that is formed by polymerizing a monomer mixture that is different from the monomer mixture of Hidaka. Present Claim 1 requires that monomer unit (D) is one that is a styrenic monomer, a styrenic macromer, a (meth)acrylate, and/or an aromatic ring-containing monomer. In contrast, the graft copolymer of Hidaka is one that is a (meth)acrylic macromer.

Applicants submit that the subject matter of present Claim 1 is novel over Hidaka as shown by Hidaka’s silence with respect to styrenic macromers. Applicants also draw the Office’s attention to new dependent Claims 15-16 and 18-19 which require that the water-insoluble particles consist of a water insoluble polymer which consists of the monomer units recited in the new dependent claims.

Moreover, present independent Claim 1 requires that the water-insoluble polymer is present in an amount of from 20 to 200 parts by weight based on 100 parts by weight of the C.I. Pigment Blue 15:4. Applicants describe the affect of the amount of polymer present in

the aqueous dispersion and water-based ink on page 5, lines 1-6 (reproduced below for convenience).

“It is preferable that the amount of the polymer is larger from the viewpoint of reducing angular dependency of the color tone. However, when the amount of the polymer is too large, the viscosity of the aqueous dispersion becomes higher, so that the viscosity of the ink exceeds an appropriate level. Therefore the amount of the monomer is preferably 10 to 500 parts by weight, more preferably 10 to 200 parts by weight based on 100 parts by weight of the C.I. Pigment Blue 15:4.”

Applicants have therefore disclosed that compositions comprising the water-insoluble polymer in certain amounts may provide a water-based ink that has superior angular dependency of color tone in comparison to other water-based inks (see further remarks below with regard to the superior angular dependency of color tone achieved with the claimed combination of vinyl polymer and pigment).

Applicants respectfully request withdrawal of the rejections in view of Hidaka.

In a further anticipation rejection, the Office rejected Claims 1 and 6 in view of Tabayashi (U.S. 6,074,467) and/or Mishina (U.S. 6,511,534). Applicants submit that amended Claim 1 is not anticipated in view of either of Tabayashi and/or Mishina as shown by the fact that the Office did not reject Claim 2 in view of the aforementioned prior art.

In the alternate to anticipation, the Office rejected Claims 1-10 as obvious under the meaning 35 U.S.C. § 103(a) in view of patent to Nakano (U.S. 6,740,690) in view of Tabayashi.

In the Examples of the present specification, Applicants compare an aqueous dispersion that contains the water-insoluble polymer of the invention in combination with C.I. Pigment Blue. A direct and side-by-side comparison of a water-based ink that contains C.I. Pigment Blue with another pigment (i.e., C.I. Pigment Blue 15:3 - a phthalocyanine dye) is provided in Table 2 of the present specification. Examples 2 and Comparative Example 1 are

a direct side-by-side comparison demonstrating that the claimed water-based ink provides significantly superior performance in comparison to a water-based ink that contains a dye that is different from C.I. Pigment Blue. The data comparing the inventive example with the comparative example is tabulated below:

Table 2

| Ex. No. and Comp. Ex. No. | Ex. 1 | Ex. 2 | Ex. 3 | Comp. Ex. 1 | Comp. Ex. 2 | Comp. Ex. 3 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Kind of Polymer* | Prep. Ex. 1 | Prep. Ex. 2 | Prep. Ex. 3 | Prep. Ex. 2 | None | None |
| Degree of Neutralization (%) | 100 | 100 | 100 | 100 | - | - |
| Kind of C.I. Pigment Blue | 15:4 | 15:4 | 15:4 | 15:3 | 15:4 | 15:3 |
| <u>Composition of Water-Based Ink (% by weight)</u> | | | | | | |
| Solid Content of Aqueous Dispersion | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Glycerol | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| 2-Pyrrolidone | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Isopropanol | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Ion-Exchanged Water | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| <u>Physical Properties of Water-Based Ink</u> | | | | | | |
| Viscosity of Ink | ○ | ○ | ○ | ○ | × | × |
| Jetting Stability | ○ | ○ | ○ | ○ | × | × |
| Gloss | ○ | ○ | ○ | ○ | × | × |
| Optical Density | ○ | ○ | ○ | ○ | × | × |
| Light-Fastness | ○ | ○ | ○ | ○ | × | × |
| Water RESistance | ○ | ⊗ | ⊗ | ⊗ | × | × |
| Rubbing Resistance | ○ | ⊗ | ⊗ | ⊗ | × | × |
| Average Particle Diameter (μm) | 0.15 | 0.16 | 0.15 | 0.15 | 0.32 | 0.30 |
| Dispersion Stability | ○ | ○ | ○ | ○ | × | × |
| Angular Dependency of Color Tone | ⊗ | ⊗ = | ⊗ | <u>Δ</u> | × | × |

(Note)

*: Prep. Ex. No. listed in the row of "Kind of Polymer" means that the aqueous dispersion obtained in its Preparation Example was used.

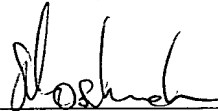
Table 2 shows that the composition of Example 2 and Comparative Example 1 are the same except for the kind of dye. The inventive example contains C.I. Pigment Blue 15:4 as recited in the presently claimed invention. On the other hand, Comparative Example 1 contains the same polymer and otherwise contains the same compositional components except that Comparative Example 1 contains C.I. Pigment Blue 15:3 instead of the C.I. Pigment Blue 15:4. The angular dependency that is achieved for the claimed invention is much better than the angular dependency achieved in compositions that contain a pigment other than the pigment of the claimed invention. The claimed water-based ink can provide an angular dependency wherein the maximum change in a^* is less than 40 whereas C.I. Pigment Blue 15:3 is able to provide an angular dependency having a maximum change in a^* of between 50 and 60. The test for determining angular dependency of color tone is provided on page 33, lines 6-24.

The Office asserts in the last paragraph on page 11 of the Office Action of July 29, 2005 that it would be obvious to use Pigment Blue 15:4 as the pigment in the composition of Nakano in order to produce good color tone and waterproof properties. Applicants submit however that neither Nakano or Tabayashi suggests or disclose that significantly superior angular dependency of color tone can be achieved through a combination of a certain water-insoluble vinyl copolymer and C.I. Pigment Blue 15:4. Applicants have thus rebutted the Office's assertion of *prima facie* obviousness by showing that the claimed composition can provide properties such as angular dependency of color tone that are not achievable with prior art pigments and are not disclosed or suggested in the prior art cited against the present claims. Applicants draw the Office's attention to new dependent Claim 21 which limits the angular dependency of the water-based ink of Claim 7.

Applicants respectfully request the withdrawal of the rejection.

Respectfully submitted,

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